

# Neonatal Issues in Immunization

## The example of Hepatitis B

Mark A. Kane  
Children's Vaccine Program  
PATH



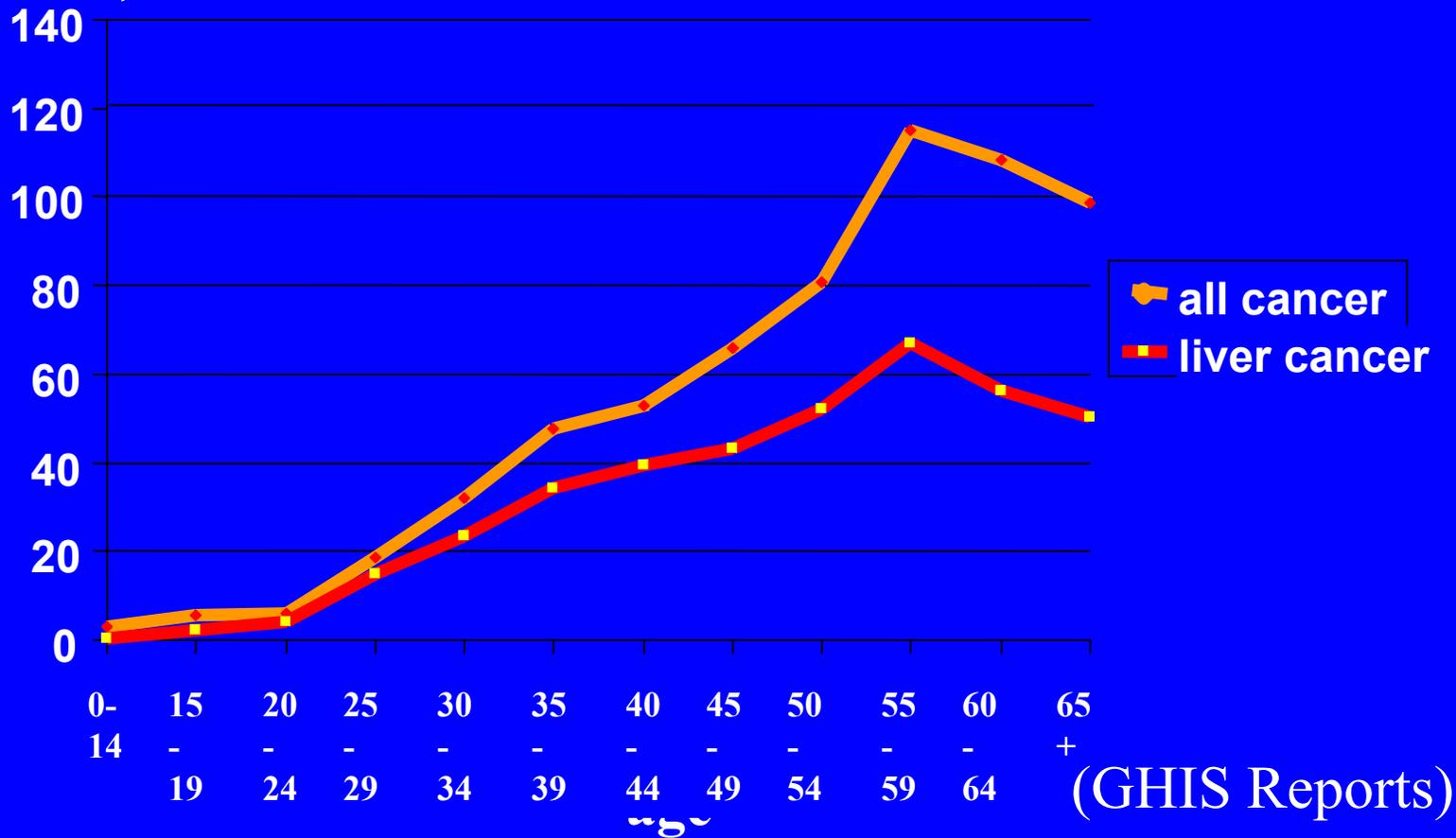
# Un homme enceinte s'accouche dans son tombeau\*



\*A pregnant man delivers in his grave

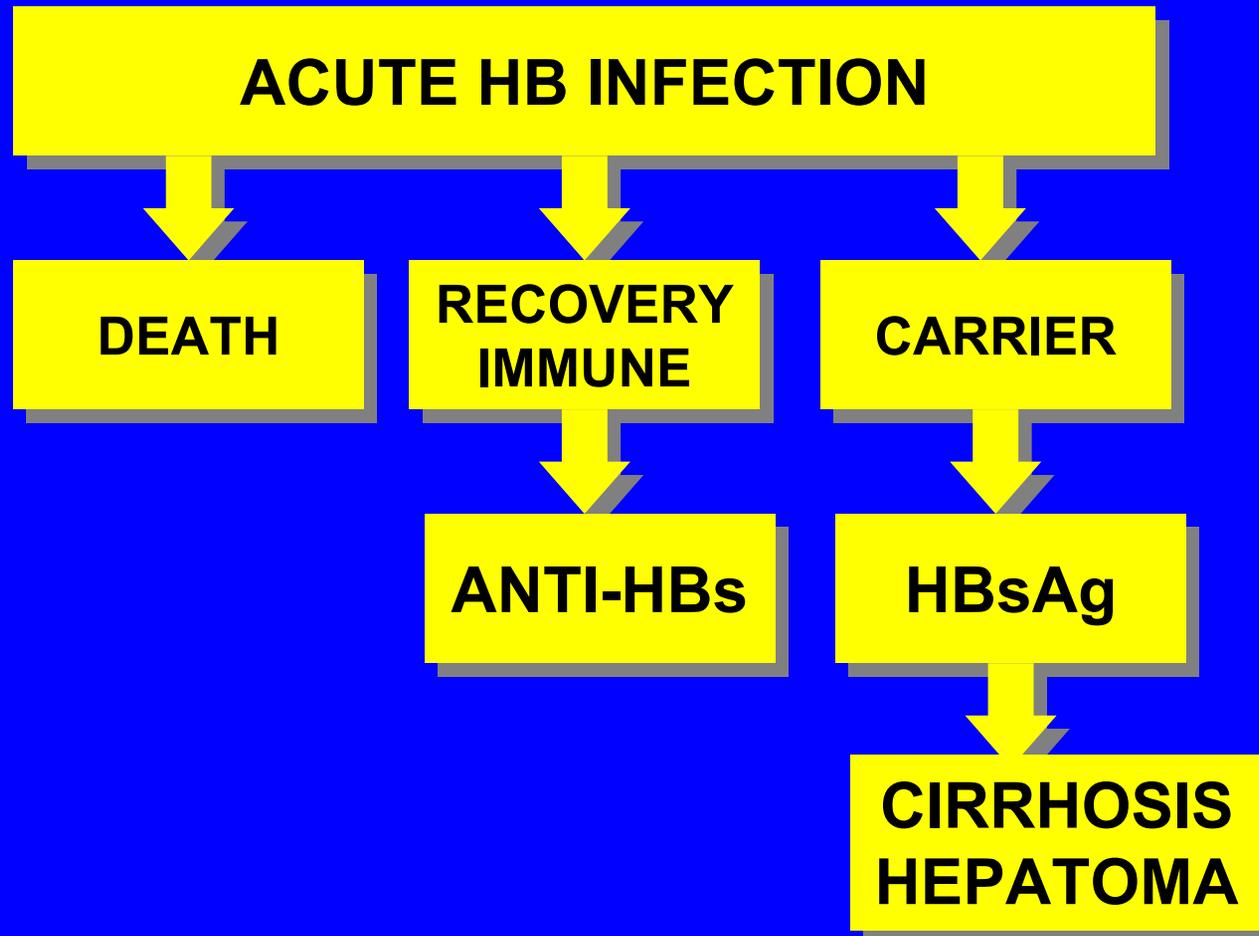
# Cancer rates, Gambian males 1986-96

incidence  
per 100,000

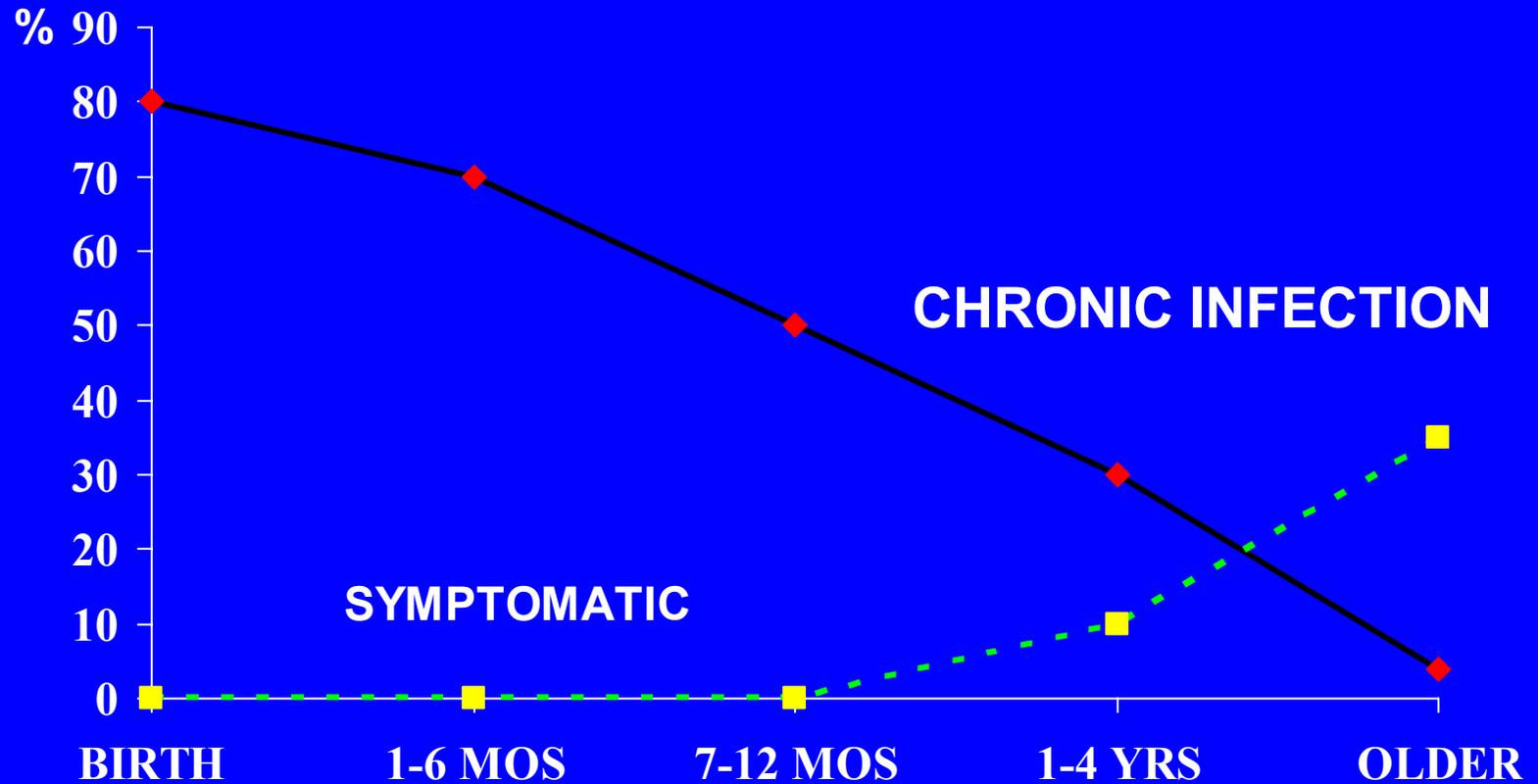


# HEPATITIS B

## OUTCOMES OF INFECTION



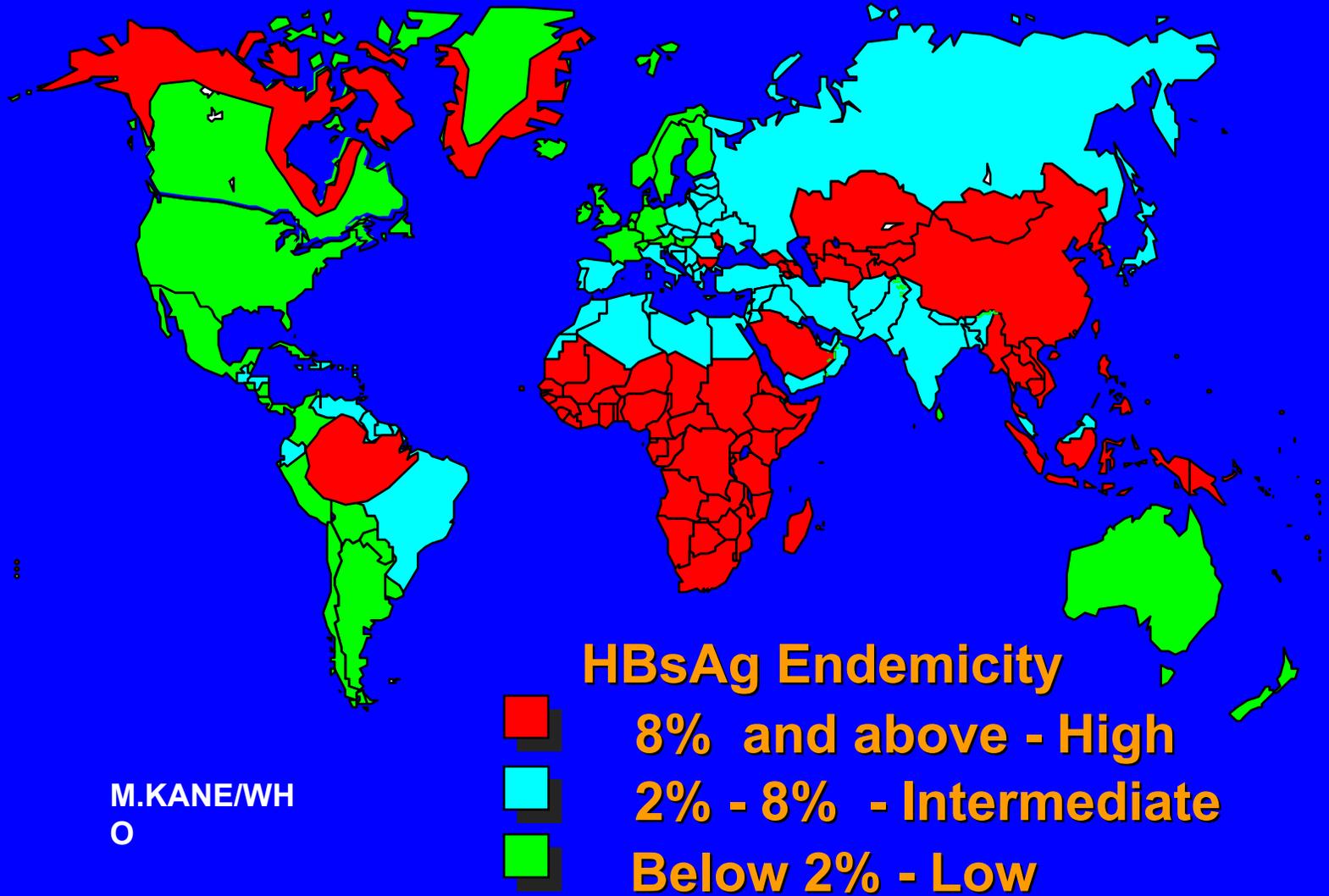
# OUTCOME OF HBV INFECTION BY AGE



# Perinatal transmission

- **Vicious cycle of perinatal transmission**
  - Not all carriers infectious (HBeAg, DNA)
  - ~ 30% carrier pool in Asia, less elsewhere
  - Carrier pool independent of hygiene or socioeconomic level
- **Outcome of perinatal transmission**
  - Asymptomatic infection
  - Immune tolerance (viral replication without liver inflammation)
  - 80% - 90% become carriers
  - Infect other children, adults
  - Perinatally acquired carriers at particularly high risk of cancer

# Geographic Pattern of Hepatitis B Prevalence



M.KANE/WH  
O

# Patterns of Transmission

- 40% Asian carrier mothers HBeAg<sup>+</sup>
- ~ 10% non-Asian carrier mothers HBeAg<sup>+</sup>
- In industrial countries many HBsAg<sup>+</sup> mothers infected as young adults are HBeAg<sup>+</sup>



# HB vaccine and HBIG

- HBIG ~75% effective in preventing perinatal carriage but protection wanes
- HBIG + Vaccine 80% - 95% effective
- Vaccine alone at birth 80% - 95% effective
- HBIG scarce, expensive, safety concerns
- Little value added vs vaccine alone at birth

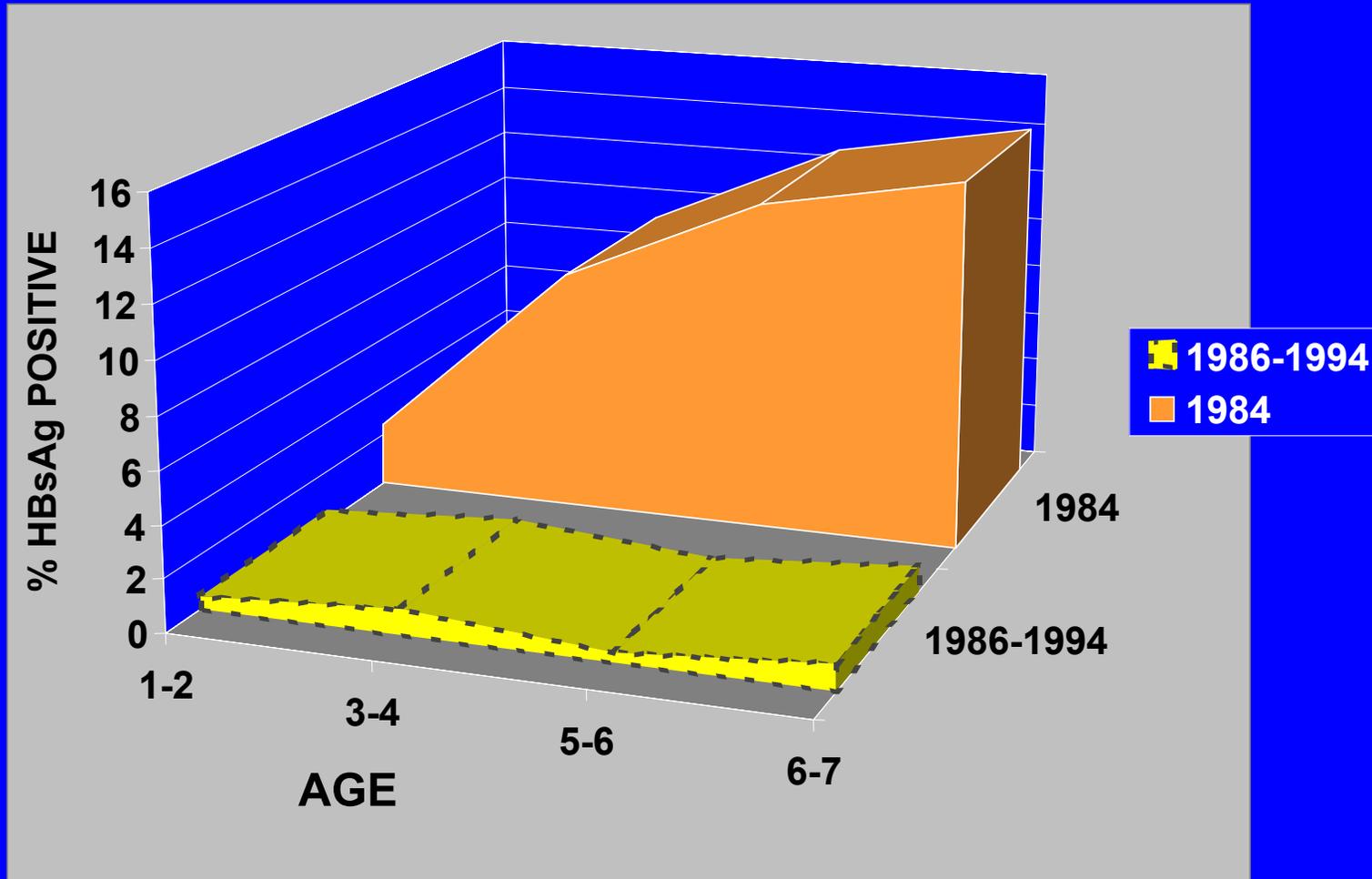
# HBsAg maternal screening

- Selective screening of “high risk” women
  - depended on knowledge and motivation of tens of thousands of physicians and nurses
  - less than 50% effective
  - A failed strategy
- Universal prenatal screening
  - Successful overall
  - Misses highest risk mothers
- Not recommended as a cost effective use of resources in developing world
  - Cost, prenatal care and laboratory system
  - Home birth
  - Value added of HBIG over vaccine alone
- Hard to stop in industrial world

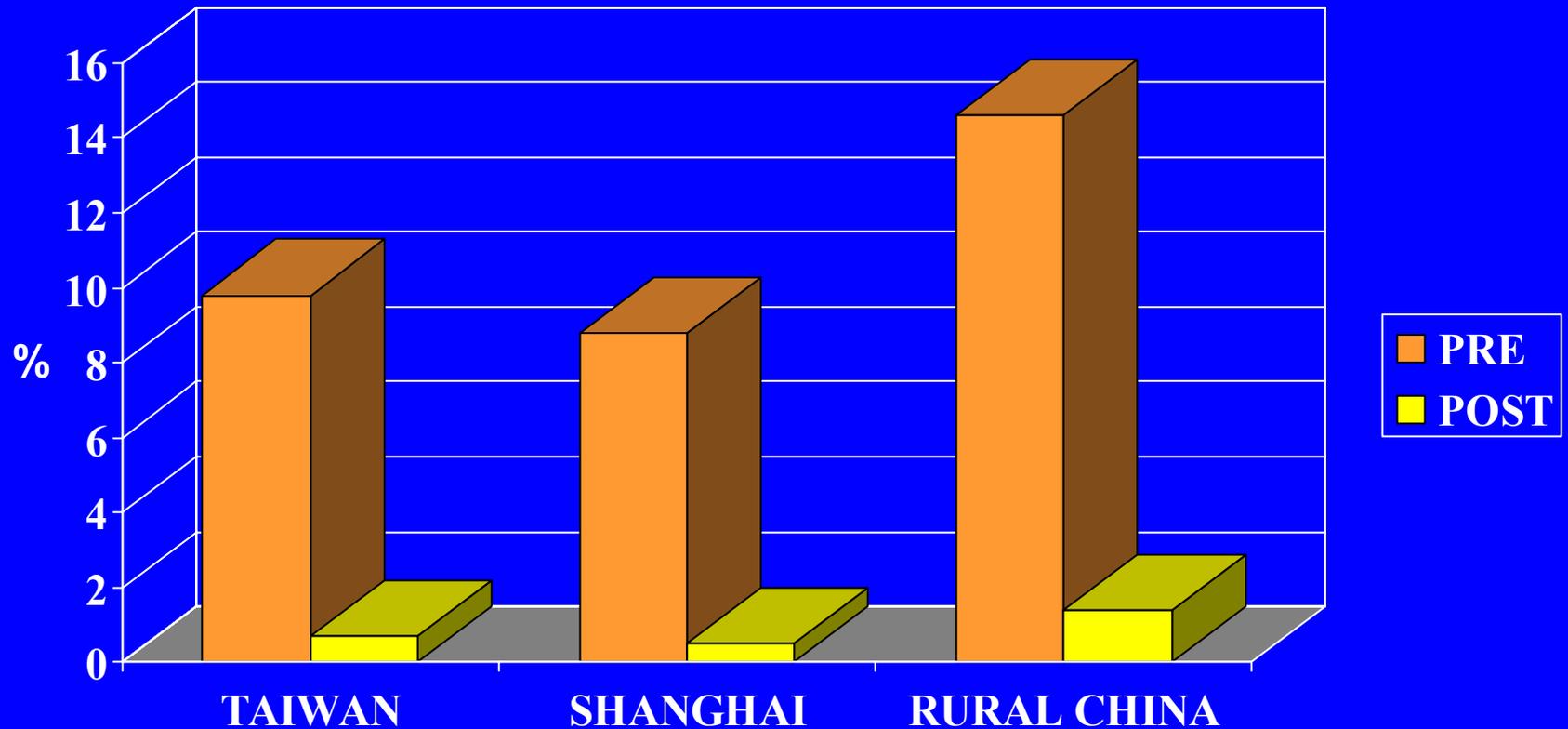
# Programmatic issues U.S.

- Vaccine only as effective as delivery system
- Prenatal care, delivery, later doses may be given by different systems: communication
- Safety concerns (mercury, MS) can disrupt delivery: starting and stopping a VERY bad strategy
- Hard to reach kids may be accessible only at birth until school age: get them on registries

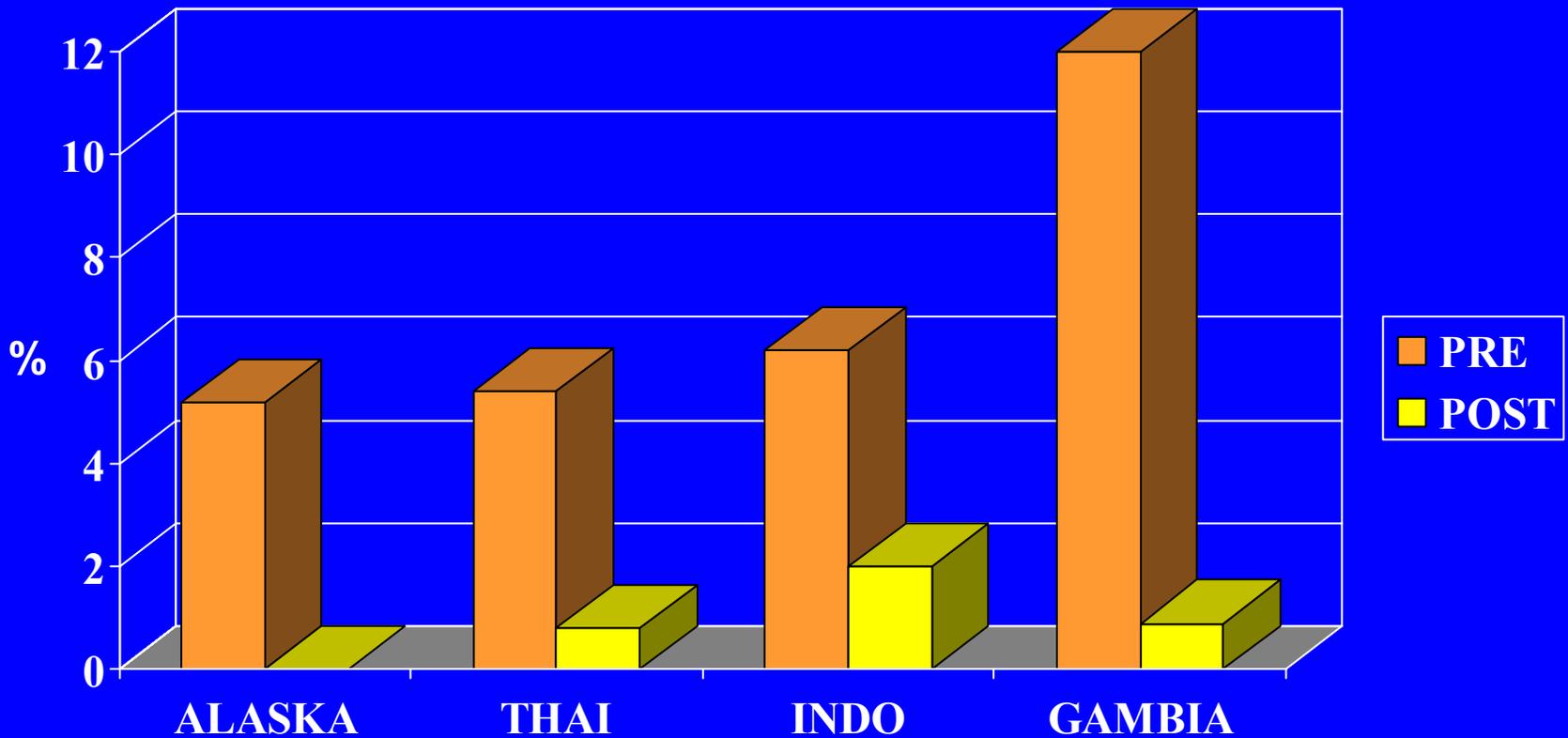
# Hep B carriers before and after immunization, Shanghai



# HBSAG PREVALENCE PRE AND POST HB IMMUNIZATION



# HBSAG PREVALENCE PRE AND POST HB IMMUNIZATION



# **HB IMMUNIZATION IMPACT ON TRANSMISSION**

- **Reduces carrier prevalence to low endemicity in immunized cohorts**
  - **<1% where perinatal Tx low**
  - **<2% where perinatal Tx high**
  - **Unvaccinated older carriers lose HBeAg and infectivity**
  - **“Double whammy” can eliminate transmission**
  - **Reduction in liver cancer already seen in Taiwan**
- **Protection continues for at least 15 years after antibody is no longer detectible**

# Reaching babies at home

- Home births common in developing world
- > 50% in poorest developing countries
- Variably attended by trained birth attendant
- Immunization (health) contact at birth uncommon
- Indonesia



Challenge:  
90% born  
at home

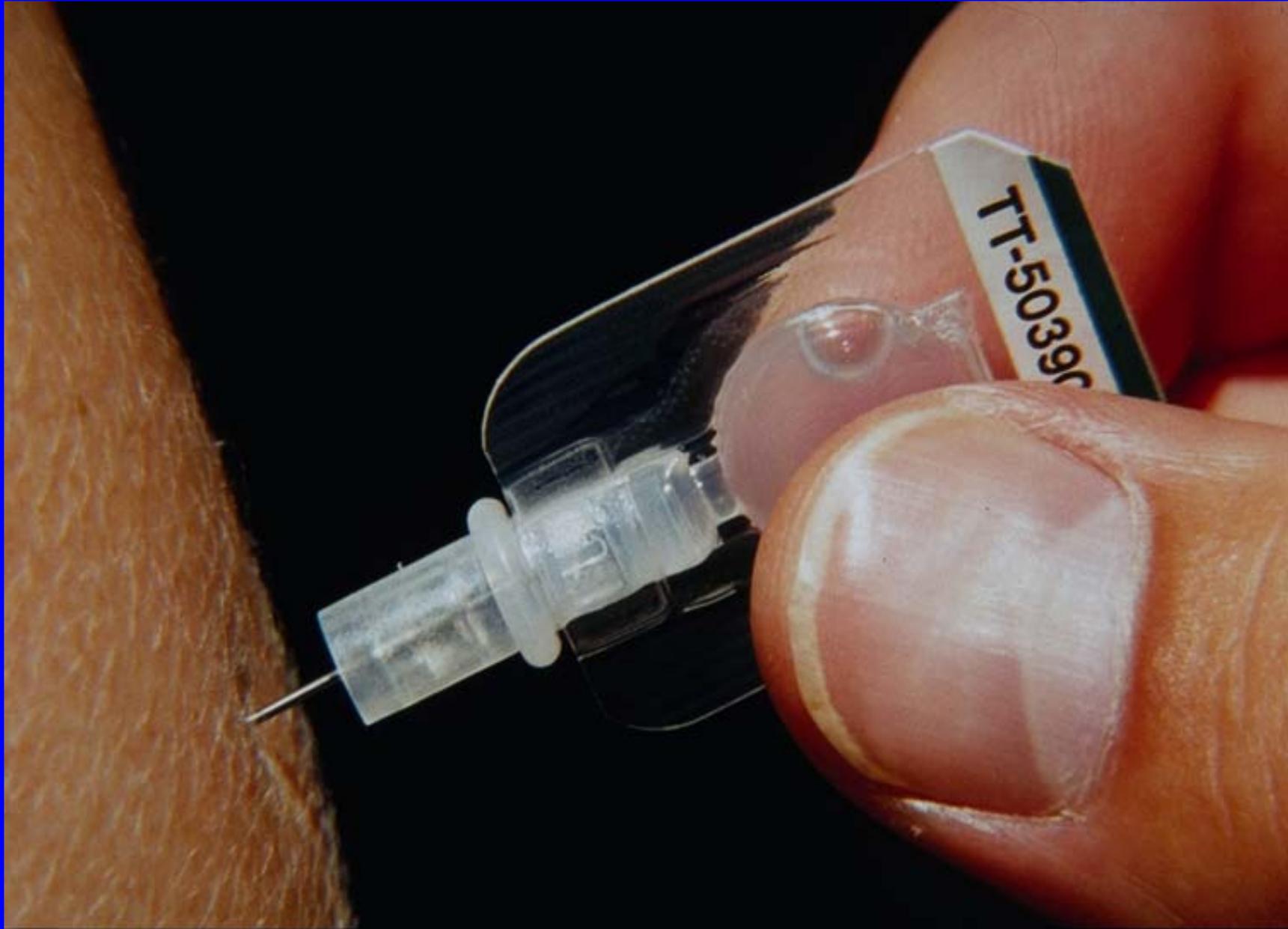
Goal:

Vaccinate all  
newborns within  
7 days of birth



70,000 Indonesian  
midwives trained to  
give a birth dose of  
HB vaccine using  
UNIJECT



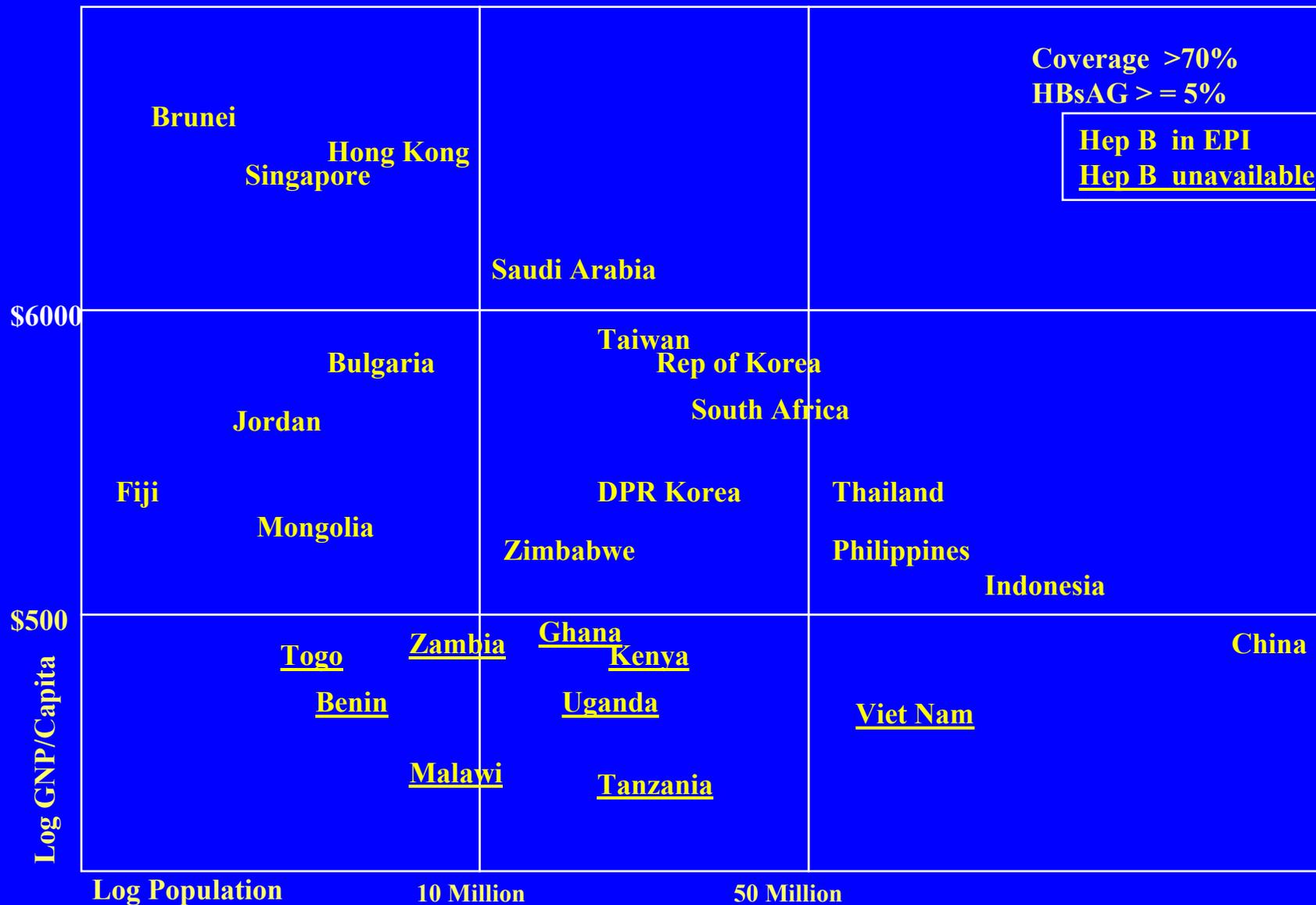


# Reaching babies at home

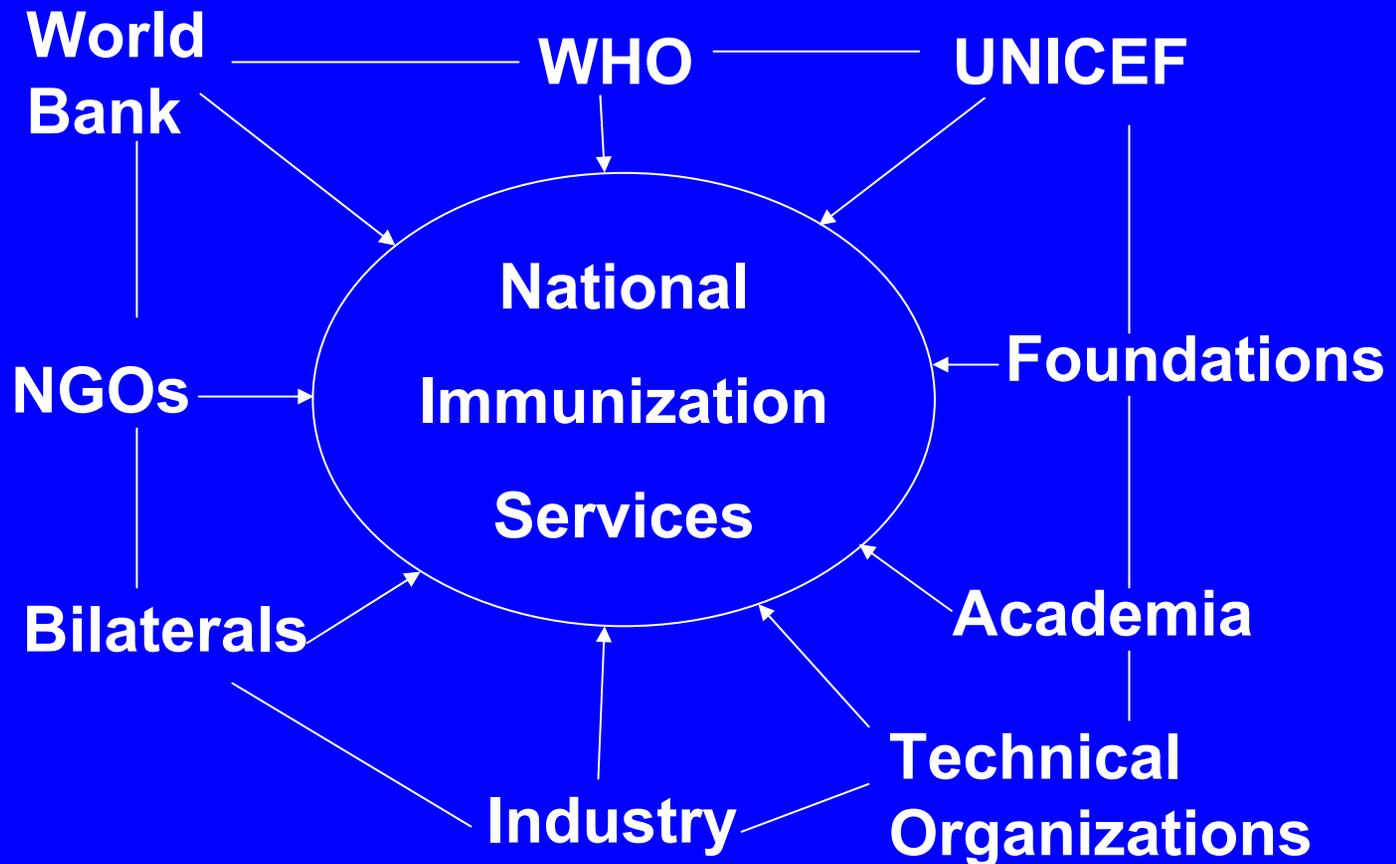
- 70% wastage with 10 dose vials
- UNIJECT simplified dosing, safe inj, disposal
- Keeping vaccine at home
- TBA's deliver vaccine and/or report births
- TBA's can be trained in safer birth delivery
- Home visits by vaccinators allow other neonatal interventions: cord care, breast feeding assistance, hygiene, micro-nutrient

- **World Health Assembly, 1992:**  
Hepatitis B vaccine should be integrated into national immunization programmes in all countries by 1997
- **WHO 9th Programme of Work (1996-2001):**  
Among children, new hepatitis B virus carrier incidence will be reduced at least 80% through integration of hepatitis B vaccine into national immunization programmes

# Impact of income on program implementation: Hepatitis B



# The GAVI Network



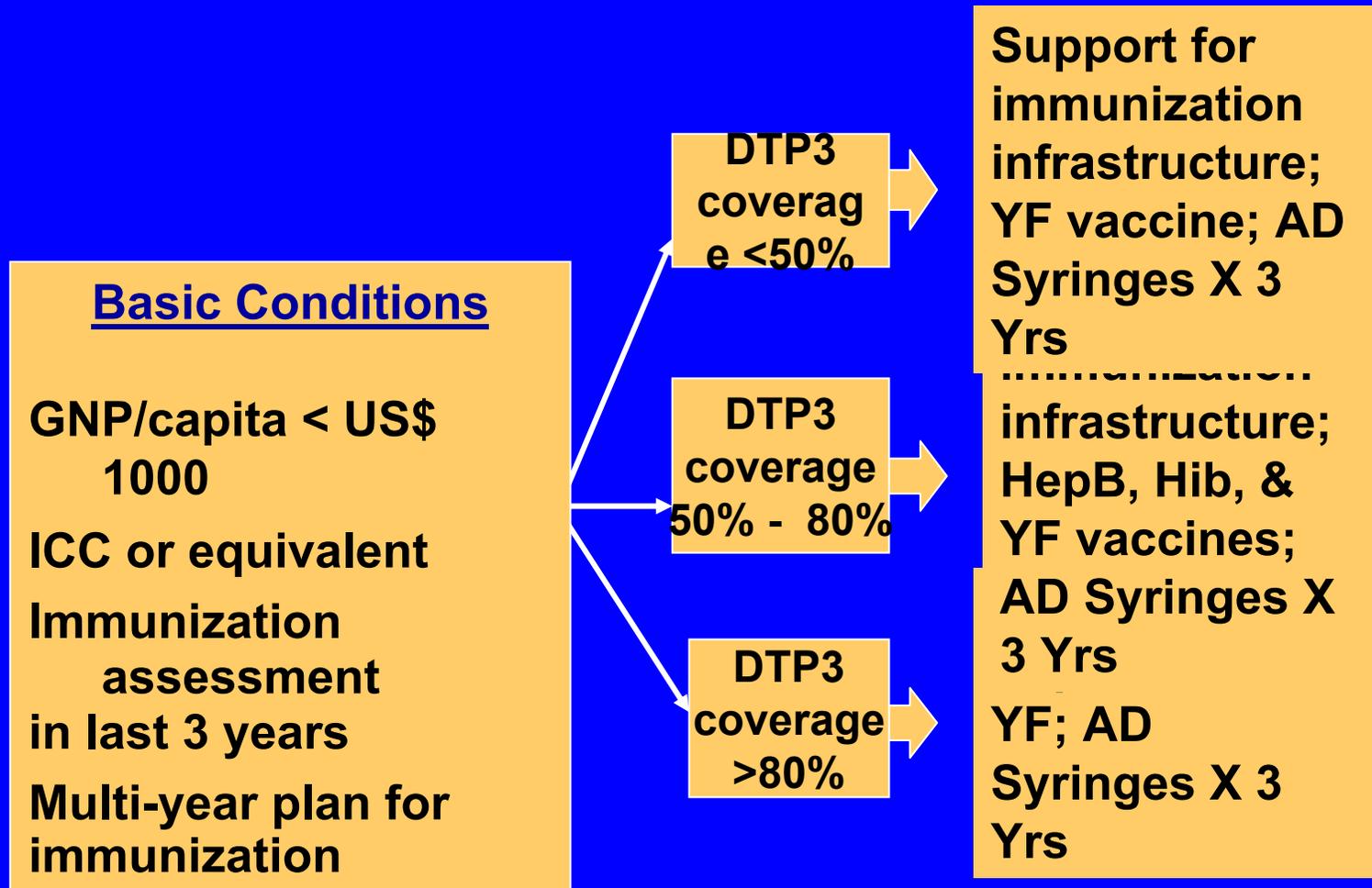
# The Vaccine Fund

- The Vaccine Fund has been established with an initial gift of \$750 million over 5 years from the Bill & Melinda Gates Foundation; additional donations have been committed by Norway, Netherlands, USA, Denmark, Sweden, Canada, France and the UK. Firm commitments now exceed \$1 Billion.
- The Fund has three separate sub-accounts for:
  - 1) procurement of new vaccines and safe syringes
  - 2) support to strengthen access and infrastructure
  - 3) expediting introduction of new vaccines

# 75 Countries Eligible to Apply to GAVI and The Vaccine Fund

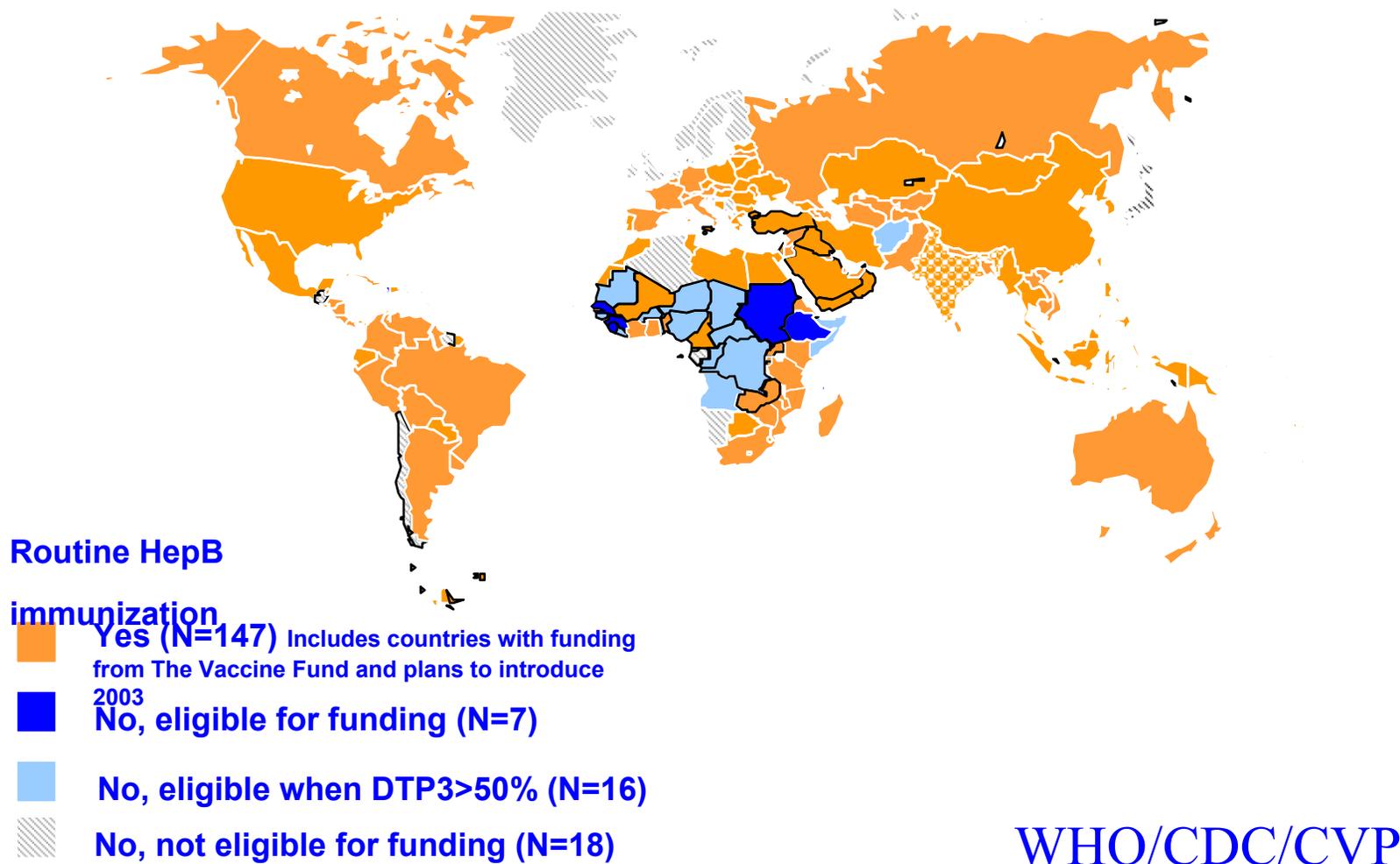


# What will the Vaccine Fund support?



Special Projects for China, India, Indonesia

# Global status of countries using hepatitis B vaccine in their national childhood immunization schedule, 2003



# Starting to finish the job

- Before GAVI 110 countries used HB vaccine in National Immunization Program
- GAVI/VF support to 44 countries
- 79% (n=147) of countries use HB vaccine
- Monovalent HB vaccine \$0.30/dose
- Birth dose supported by GAVI
- % getting birth dose unknown
- All newborns in China get free vaccine
- Birth dose in Indonesia
- India to introduce HB vaccine